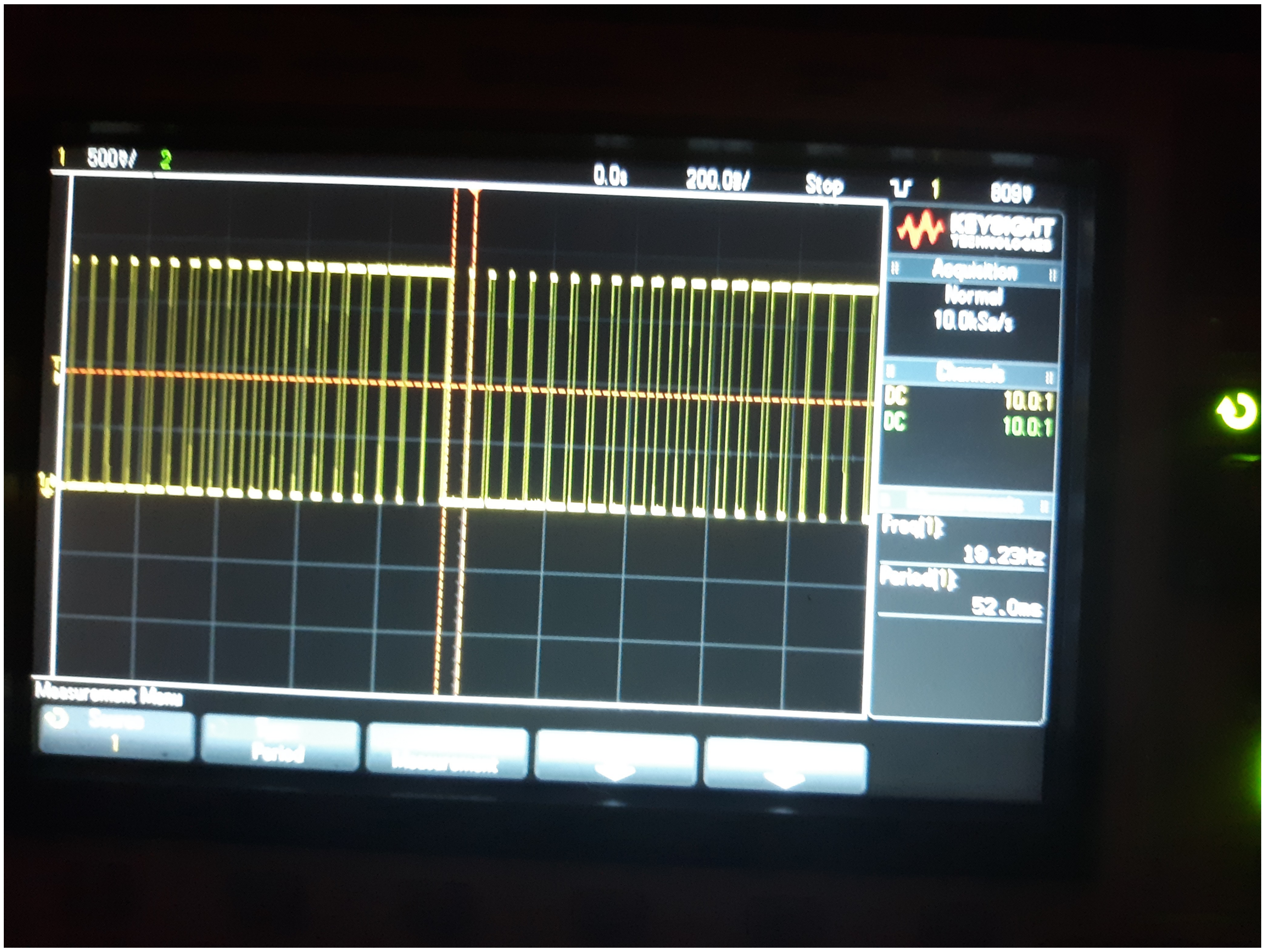
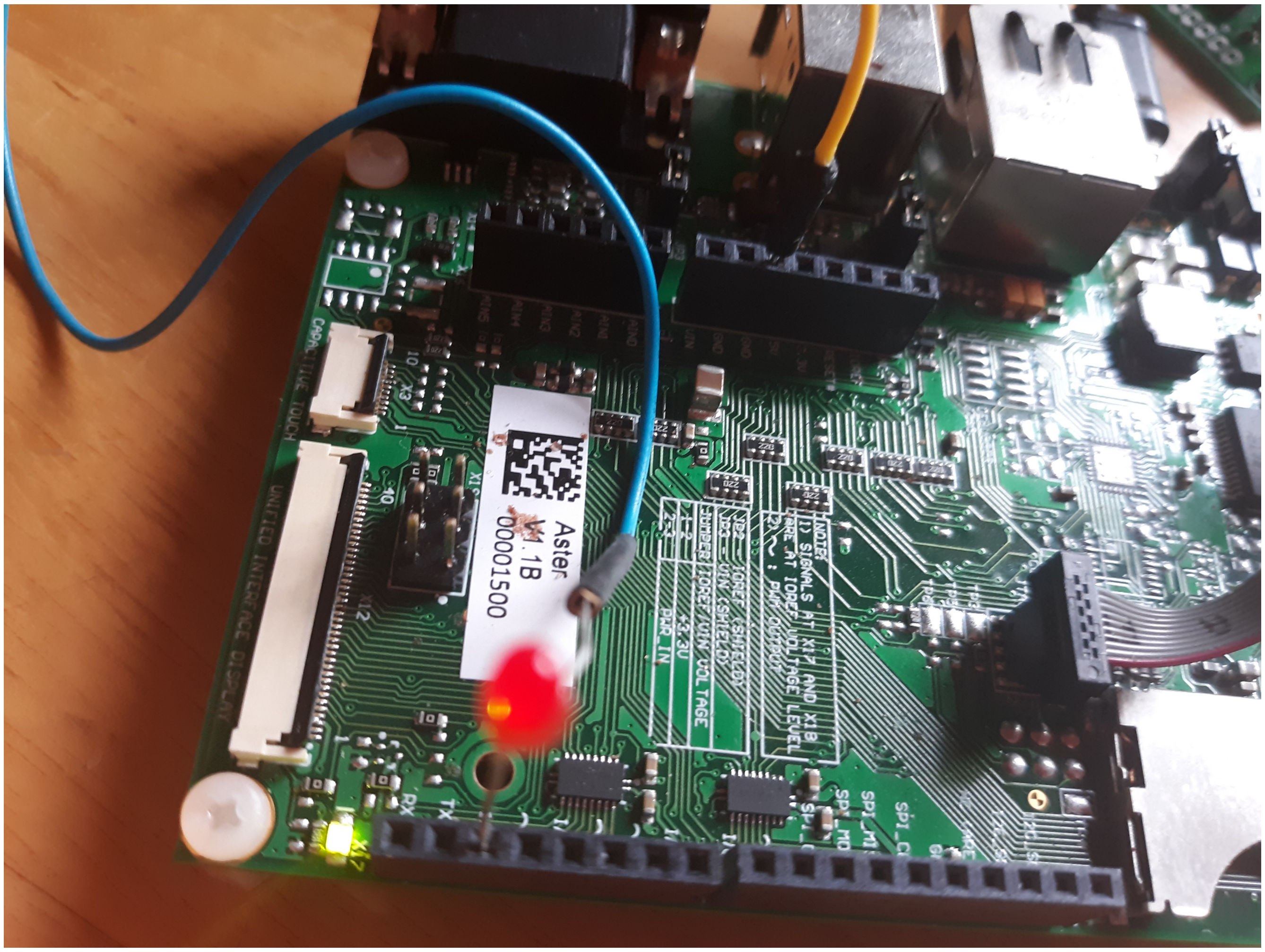


This is a Scalable PWM Modulator based on GPT on an Toradex Colibri imx7 module M4 core suitable for driving current through LED(s) or controlling brightness/contrast on a display and even perhaps motor control with some adjustments.

Make sure you get the pinning correct as I have changed the settings to allow PWM LED routing to the Arduino headers. If your LED burns, assume you routed incorrectly...Not assuming any responsibility for any damage that may happen to your board! With that out of the way, this one simple, fast approach to PWM control. A better, multi-channel controller/driver is on the way soon! Email me at : solaraeng@gmail.com if any issues or improvements you discovered...Enjoy!



```
/*
 * Copyright (c) 2015, Freescale Semiconductor, Inc.
 * All rights reserved.

*************************************************************************************
****
 * Project - mx7_colibri_m4_PWM_imx_demo (PWM Modulator)
 * Created by : Mario Ghecea
 * Solara Engineering (solaraeng@gmail.com)
 * 6/29/2019
 * Purpose - To facilitate a scalable and programmable PWM algorithm within FreeRTOS
 * utilizing any number of dividing steps (1-n) for smoothness and PWM resolution
 * Only one generic timer (GPT) is used as counter for each alternating phase step...
 * This could be used as a generic LED driver, contrast for a display and perhaps
 * motor control through expansion.
 * If you reuse or distribute for your purpose please keep this header...

*************************************************************************************
******
 * Redistribution and use in source and binary forms, with or without modification,
#include "FreeRTOS.h"
#include "task.h"
#include "board.h"
#include "debug_console_imx.h"
#include "gpio_ctrl.h"
#include "hw_timer.h"


#define PWM_MIN                    (0.1f) // Lets assume 1% phase increases
#define PWM_MAX                            (1.0f) // Lets assume your phase max at 100%
#define PWM_FREQ_DIVIDER      1     // Your PWM period frequency divider in milliseconds
(1/PWM_FREQ_DIVIDER) - LED Bink Interval
#define PWM_STEPS_PER_PHASE            20       // Increment PWM_STEPS_PER_PHASE
for a higher resolution (Above 20 it may exibit some glitches)
#define PWM_RESOLUTION_COUNTER  (1000/(PWM_FREQ_DIVIDER *
PWM_STEPS_PER_PHASE))   // Value in ms per phase
```

```
static volatile uint32_t blinkingIntervalHigh = PWM_RESOLUTION_COUNTER;
static volatile uint32_t blinkingIntervalLow = PWM_RESOLUTION_COUNTER;
static volatile float pwm = PWM_MIN;
static volatile bool start = true;

void SyncPWM();
void Resync();

/******************************************************************************
*
* Function Name: ToggleTask
* Comments: this task is used to turn toggle on/off LED.
* This task has the effect of staring on cue so it will sync the phases
* correctly based on start signal from Phase Synchronizer (SwitchTask).
*
******************************************************************************/
void ToggleTask(void *pvParameters)
{
   while (true)
   {
         if (blinkingIntervalHigh != 0 && start == true)
         {
                  // If we have been signaled to start, lets sync the PWM phase
                  SyncPWM();
                  // Process PWM Phase High
                           GPIO_Ctrl_ToggleLed(true);
                           /* Use Hardware timer to get accurate delay */
                           Hw_Timer_Delay(blinkingIntervalHigh);
                           // Process PWM Phase Low
                           GPIO_Ctrl_ToggleLed(false);
                           Hw_Timer_Delay(blinkingIntervalLow);
         }
   }
}

// Sync PWM Block - Phase Increment
void SyncPWM()
{
         blinkingIntervalHigh = PWM_RESOLUTION_COUNTER  * pwm ;
         blinkingIntervalLow =  PWM_RESOLUTION_COUNTER  * (1.0f - pwm);

         pwm += (0.5f / PWM_STEPS_PER_PHASE);

         Resync();
}

void Resync()
{
         if (pwm >= PWM_MAX)
```

```
        {
                pwm = PWM_MIN;
        }
}


/*****************************************************************************
*
* Function Name: main
* Comments: main function, toggle LED and switch the blinking frequency by key.
*
*****************************************************************************/
int main(void)
{
  /* Initialize board specified hardware. */
  hardware_init();

  Hw_Timer_Init();
  GPIO_Ctrl_Init();

  PRINTF("\n\r================= PWM Blinking Demo ==================\n\r");

  /* Create a the APP main task. */
  xTaskCreate(ToggleTask, "Toggle Task", configMINIMAL_STACK_SIZE,
          NULL, tskIDLE_PRIORITY+1, NULL);

  /* Start FreeRTOS scheduler. */
  vTaskStartScheduler();

  /* should never reach this point. */
  while (true);
}

/*******************************************************************************
 * EOF
 ******************************************************************************/
```